Drainage Narrative – Issaquah High School #4 and Elementary School #17

1.0 Project Overview

The Issaquah High School and Elementary School project proposes to develop tax parcels 1624069001, 1624069029, 1624069031. Tax parcel 1624069001 previously housed The City Church while the other two parcels are currently undeveloped with mostly forested cover. Project improvements include a new high school building, new elementary school building, parking areas, sports fields, tennis courts, playgrounds, a water system, a sewer system, and stormwater drainage facilities, flow control facilities, and stormwater quality facilities. The project site is located in the northeast quadrant of Section 16, Township 24 North, Range 6 East, in the City of Issaquah, King County, Washington. The site is bounded by 228th Avenue Southeast to the east and residential properties to the north, west, and south.

This narrative outlines our intentions to meet the on-site stormwater design for this project. We understand that our on-site project improvements are subject to requirements of the 2014 Department of Ecology (DOE) *Stormwater Management Manual for Western Washington* (*SMMWW*) and the City of Issaquah 2017 *Stormwater Design Manual Addendum* (*ISDMA*). Frontage improvements to 228th Avenue Southeast are located within the City of Sammamish and will be designed to their adopted stormwater code.

The information below outlines the existing and proposed conditions as well as a discussion of each of the required minimum requirements and how they will be addressed. Further information and detailed calculations will be provided as part of the plan review process.

1.1 Existing Site Conditions

The existing site is approximately 40.8 acres in size, with frontage along 228th Avenue Southeast. The site has two existing access driveways, both located off of 228th Avenue Southeast. The site was previously developed as City Church in the 1950s. Similar to most construction during this time, the original project was completed without the stormwater control systems that we now require as part of construction. As a result of this the runoff from this site and surrounding developments caused an increase in runoff, both volume and flow rates. The Church development was previously located in the center of the project site with several parking areas and access roads surrounding this existing building. The rest of the existing site is mostly forest cover.

The immediate area surrounding the proposed site is mostly residential properties with their own stormwater drainage systems. 228th Avenue Southeast to the east is significantly lower in grade than the majority of the project site. The center of the project site is a high point that discharges water away from the center of the site, forming Northeast and Southwest basins. Little to no runoff from the adjacent properties or right-of-way is expected to flow onto the existing project site.

The site has a natural drainage divide that runs diagonal across it with the northeast side draining to the ditch on the west side of 228th and the southwest portion draining to a stormwater system to the west. These discharge locations are shown on the accompanying conceptual stormwater plan.

1.2 Proposed Project Description

The proposed on-site project improvements for Issaquah High School and Elementary School include two new school buildings, parking areas, sports fields, tennis courts, playgrounds, a water system, a sewer system, and stormwater drainage facilities, flow control facilities, and stormwater quality facilities. As part of the construction of the school stormwater systems to collect, treat, and release stormwater will be incorporated. These systems are designed to match runoff rates from the site prior to settlement in the area from 50-percent of the 2-year storm through the 50 year event. Due to the previous development on the site this means that this project will reduce existing and historic runoff events from this site. This will be accomplished by constructing stormwater detention facilities with outlet controls to meter the release of stormwater to the existing downstream conveyance path. Detailed discussion of each of the minimum requirements is provided below.

2.0 Summary of Minimum Requirements

This project is subject to the 2014 *SMMWW* as well as the *ISDMA*. The project is classified as a new development because the existing impervious coverage is less than 35% of the total project area. Per Table 1-1 of the *ISDMA*, all Minimum Requirements (MRs) apply to all new and replaced hard surfaces.

2.1 MR 1 – Preparation of Stormwater Site Plans

A final drainage report and plans will be provided as part of the project to address this requirement.

2.2 MR 2 – Construction Stormwater Pollution Prevention

A Construction Stormwater Pollution Prevention Plan (CSWPPP) will be prepared for this project.

2.3 MR 3 – Source Control of Pollution

The proposed project is required to provide source control of pollution. The following are proposed measures to be implemented as part of the civil plans:

- All pollutants, including waste materials and demolition debris created on-site during construction, shall be handled and disposed of in a manner that does not cause contamination of surface water.

- Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste).

- Maintenance and repair of heavy equipment and vehicles that may result in discharge or spillage of pollutants to the ground or into surface water runoff must be conducted using spill prevention measures such as drip pans.

- All BMPs specified in the CSWPPP must be maintained throughout the construction process. Please see the attached CSWPPP for more details about all BMPs that will be implemented on the project site.

2.4 MR 4 – Preservation of Natural Drainage Systems and Outfalls

The existing site is home to the former City Church building and two undeveloped parcels. The site has an existing high point located near the center of the site which splits the project site into two separate basins, Northeast and Southwest.

The Northeast basin discharges to the 228th Avenue Southeast right-of-way. The Southwest basin discharges to the existing Providence Point housing development, located along the north, west and south property boundaries of the project site, with a small portion of the site in the southeast corner discharging to the 228th Avenue Southeast right-of-way. This existing Southwest basin is split into nine sub basins with ultimate discharge locations to Providence Point, each with a separate outlet location. Refer to the attached ISD Historic Basins Map for existing surface characteristics and outfall locations for each of these existing sub basins. The attached Providence Point Outfall Sub basins Characteristics Calculations show calculations which convert the existing impervious areas found onsite to equivalent runoff area by using the impervious and pervious CN values; this information has been used to compare the proposed equivalent runoff area to existing equivalent runoff area which discharges to Providence Point.

The proposed design will maintain these two basins, northeast and southwest, while providing on-site flow control via detention through several underground detention vault/chamber systems with water quality facilities proposed downstream of these detention systems.

An overflow system from the Southwest basin is also being constructed that will discharge to the existing storm system in 228th and draining to the south. This system will provide an alternate flow path for water and avoid the Providence Point system for runoff rates higher than the historic rates already seen by that system. The downstream conveyance system in 228th appears to have additional capacity that could not be verified in the Providence Point system. This overflow system will not divert runoff from its ultimate discharge location of Lake Sammamish. Historic basin maps for the southwest basin are attached to this memo.

2.5 MR 5 – On-Site Stormwater Management

The project will meet the List #2: On-Site Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #9 found in the *ISDMA*.

For all proposed lawn and landscaped areas, the Post-Construction Soil Quality and Depth in accordance with BMP T5.13 of the *SMMWW*.

For the proposed roof area, full dispersion is not an option because the proposed site will have less than 65% native vegetation retained on-site. Bioretention is also not an option to manage the proposed roof area on-site due to the low infiltration rates found on-site based on information provided by Associated Earth Sciences Incorporated as part of the Subsurface Exploration, Geotechnical Hazard, and Preliminary Geotechnical Engineering Report, dated 17 September 2019, found in Appendix C. Downspout dispersion systems are not an option due to the large roof areas proposed for the two schools and the limited amount of vegetation proposed on-site. Most areas with enough proposed vegetation for dispersion will be located on very steep slopes which will make dispersion infeasible and ineffective. Perforated stub out connections are the final BMP for roof areas found on Table 1-5 of the *ISDMA*. Both the elementary school and the high school, and all other hard surfaces proposed on-site, discharge to large, underground detention systems for flow control. These systems will be lined with washed rock and function similar to perforated stub out connections by allowing small amounts of infiltration during the drier months. These facilities meet the design intent of perforated stub out connections and will service much more hard surfaces than the proposed school roof areas therefore we believe the intent of the on-site stormwater management BMP. The elementary school and high school roof drainage systems will be connected to underground detention facilities that will be release runoff at a controlled rate.

For all other new and replaced hard surfaces found on-site, full dispersion is not an option for the same reasons as discussed above for the proposed roof area. Permeable pavement and bioretention are also not a viable option for stormwater management on the project site due to the low infiltration rates found on-site, as discussed above. Sheet flow dispersion systems are not an option due to the limited amount of vegetation proposed on-site. Most areas with enough proposed vegetation for dispersion will be located on very steep slopes which will make dispersion infeasible and ineffective. All Stormwater Management BMPs listed under Other Hard Surfaces are infeasible for this project site, therefore no On-Site Stormwater Management BMPs are required for Other Hard Surfaces.

2.6 MR 6 – Runoff Treatment

The *ISDMA* requires phosphorus treatment for all stormwater discharging to surface water. All runoff generated on-site ultimately discharges to Laughing Jacobs Creek and its tributary streams therefore Phosphorus Treatment is required. The *ISDMA* also required enhanced treatment for all commercial project sites that discharge through a conveyance system to fresh waters designated for aquatic life however, Section 2.4.6.2.3 of the *ISDMA* states that *areas* identified as subject to Basic Treatment requirements are not also subject to Enhanced Treatment requirements. Section 2.4.6.2.4 of the *ISDMA* allows for commercial landscape areas and commercial areas that do not involve pollution-generating sources other than parking of employees' private vehicles to be treated with Basic Treatment. This commercial school development includes a High School with student drivers. Students and staff are both considered employees for the purpose of this analysis because their driving patterns will match those of school faculty and staff therefore, only visitor parking and all access roads shall be considered Enhanced Treatment Areas. Section 2.4.6.2.4 of the *ISDMA* also states for that areas with a mix of land types, the Basic Treatment requirement shall apply when the runoff from areas subject to Basic Treatment requirement comprises 50% or more of the total runoff within a threshold discharge area. The table below shows total on-site areas tributary to onsite stormwater facilities for both the Northeast and Southwest basins along with Enhanced Treatment areas to show that these areas are significantly less than 50% of each basin.

Basin	Total Area (ac)	Enhanced Treatment Area (ac)	Percentage of Total
Northeast	16.73	2.05	12.3%
Southwest	20.39	2.16	10.6%
Total	37.12	4.21	11.3%

Based on the information provided in the table above, Basic Treatment paired with Phosphorus Treatment is required for all pollution generating surfaces proposed on-site. Treatment will be provided downstream of stormwater detention for all on-site facilities that require treatment therefore the full 2-year release rate from these detention facilities is used for water quality facility design.

The proposed project site is not considered high-use because the expected average daily traffic count is much smaller than 100 vehicles per 1,000 square feet of gross building area (approximately 157,000-sf); petroleum storage and transfer in excess of 1,500 gallons per year is not proposed; parking, storage, or maintenance of 25 or more vehicles that are over 10 tons gross weight is not proposed; and there are no road intersections proposed on-site. Though over 25 school busses will remain parked on-site throughout the school day from drop-off to pick-up, the project site will not be the location of overnight storage, maintenance, fueling, or washing of these school busses. Chapter V-2, Section V-2.1, Step 2 of the *SMMWW* notes "all-day parking areas are not intended to be defined as high-use sites and should not require an oil control facility." This note is in reference to parking, storage, or maintenance of 25 or more vehicles that are over 10 tons gross weight. The intent of the DOE Oil Control Menu is to mitigate oil in stormwater from sites that generate high concentrations of oil die to high traffic turnover or the

frequent transfer of oil and is not intended to apply to sites that are just providing all-day parking of vehicles.

2.7 MR 7 – Flow Control

Minimum Requirement #7 will be met using underground detention facilities and flow control structures. The proposed stormwater systems systems are designed to match runoff rates from the site prior to settlement in the area from 50-percent of the 2-year storm through the 50 year event. For this site the assumed pre-developed land cover is a forested condition. Due to the previous development on the site this means that this project will reduce existing and historic runoff events from this site. This will be accomplished by constructing stormwater detention facilities with outlet controls to meter the release of stormwater to the existing downstream conveyance path.

The attached Providence Point Basin Overflow Concept shows the proposed Southwest basins which discharge to Providence Point along with the proposed equivalent runoff area, as discussed under MR 4 of this narrative. This exhibit shows that the overflow runoff area discharging to Providence Point is less than the existing equivalent runoff area discharging to Providence Point.

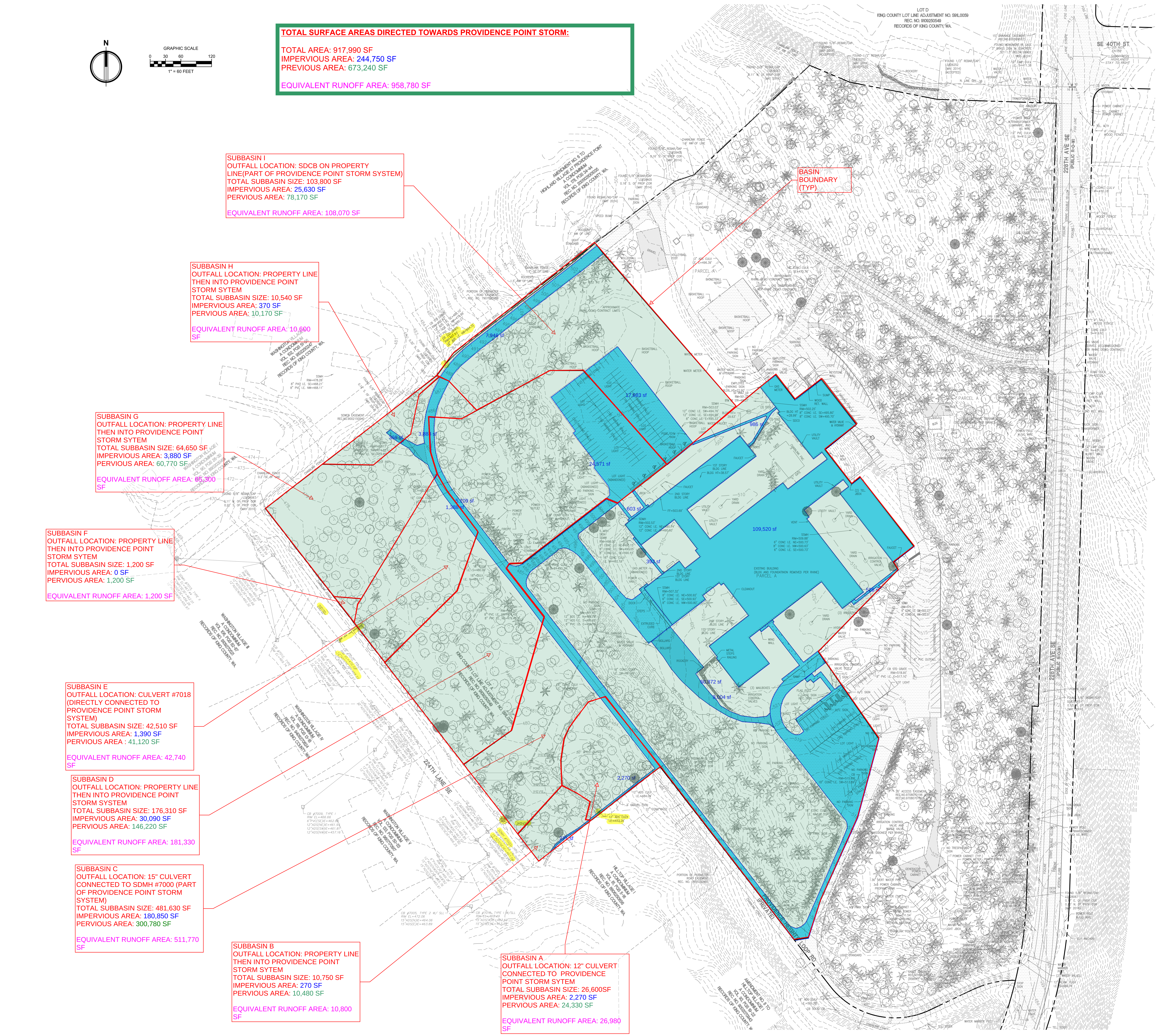
2.8 MR 8 – Wetlands Protection

There are two wetlands located on-site. Wetland B is located on the west side of the site and was created due to the runoff from the Church property. We propose to protect this wetland and maintain the existing volume and duration of flow to them to ensure they continue to function in their current condition. Wetland C is a slope wetland located along the existing Providence Heights Loop private access road. The entirety of Wetland C will be impacted; this impact is unavoidable and is the minimum impact necessary to construct the new school campus. These impacts will eb permanent and cannot be restored. To mitigate for this impact on Wetland C, over 10,800-sf of significant trees will be retained on-site within the area surrounding Wetland B; this provides a 6:1 impact ratio. Expanding Wetland B to mitigate for impacts to Wetland C would require removal of significant trees surrounding Wetland B; this would reduce the overall number of significant trees on the site and reduce wildlife habitat quality in the area around Wetland B.

2.9 MR 9 – Operation and Maintenance

An operation and maintenance manual will be provided for this project.

ISD HISTORIC BASINS MAP



N
GRAPHIC SCALE
0 30 60 120
1" = 60 FEET
TOTAL SURFACE AREAS DIRECTED TOWARDS PROVIDENCE POINT STORM:
TOTAL AREA: 917,990 SF
IMPERVIOUS AREA: 244,750 SF
PREVIOUS AREA: 673,240 SF
EQUIVALENT RUNOFF AREA: 958,780 SF
SUBBASIN I
OUTFALL LOCATION: SDCB ON PROPERTY LINE(PART OF PROVIDENCE POINT STORM SYSTEM)
TOTAL SUBBASIN SIZE: 103,800 SF
IMPERVIOUS AREA: 25,630 SF
PERVIOUS AREA: 78,170 SF
EQUIVALENT RUNOFF AREA: 108,070 SF
BASIN BOUNDARY (TYP)
SUBBASIN H
OUTFALL LOCATION: PROPERTY LINE THEN INTO PROVIDENCE POINT STORM SYSTEM
TOTAL SUBBASIN SIZE: 10,540 SF
IMPERVIOUS AREA: 370 SF
PERVIOUS AREA: 10,170 SF
EQUIVALENT RUNOFF AREA: 10,600 SF
SUBBASIN G
OUTFALL LOCATION: PROPERTY LINE THEN INTO PROVIDENCE POINT STORM SYSTEM
TOTAL SUBBASIN SIZE: 64,650 SF
IMPERVIOUS AREA: 3,880 SF
PERVIOUS AREA: 60,770 SF
EQUIVALENT RUNOFF AREA: 65,300 SF
SUBBASIN F
OUTFALL LOCATION: PROPERTY LINE THEN INTO PROVIDENCE POINT STORM SYSTEM
TOTAL SUBBASIN SIZE: 1,200 SF
IMPERVIOUS AREA: 0 SF
PERVIOUS AREA: 1,200 SF
EQUIVALENT RUNOFF AREA: 1,200 SF
SUBBASIN E
OUTFALL LOCATION: CULVERT #7018 (DIRECTLY CONNECTED TO PROVIDENCE POINT STORM SYSTEM)
TOTAL SUBBASIN SIZE: 42,510 SF
IMPERVIOUS AREA: 1,390 SF
PERVIOUS AREA : 41,120 SF
EQUIVALENT RUNOFF AREA: 42,740 SF
SUBBASIN D
OUTFALL LOCATION: PROPERTY LINE THEN INTO PROVIDENCE POINT STORM SYSTEM
TOTAL SUBBASIN SIZE: 176,310 SF
IMPERVIOUS AREA: 30,090 SF
PERVIOUS AREA: 146,220 SF
EQUIVALENT RUNOFF AREA: 181,330 SF
SUBBASIN C
OUTFALL LOCATION: 15" CULVERT CONNECTED TO SDMH #7000 (PART OF PROVIDENCE POINT STORM SYSTEM)
TOTAL SUBBASIN SIZE: 481,630 SF
IMPERVIOUS AREA: 180,850 SF
PERVIOUS AREA: 300,780 SF
EQUIVALENT RUNOFF AREA: 511,770 SF
SUBBASIN B
OUTFALL LOCATION: PROPERTY LINE THEN INTO PROVIDENCE POINT STORM SYSTEM
TOTAL SUBBASIN SIZE: 10,750 SF
IMPERVIOUS AREA: 270 SF
PERVIOUS AREA: 10,480 SF
EQUIVALENT RUNOFF AREA: 10,800 SF
SUBBASIN A
OUTFALL LOCATION: 12" CULVERT CONNECTED TO PROVIDENCE POINT STORM SYSTEM
TOTAL SUBBASIN SIZE: 26,600SF
IMPERVIOUS AREA: 2,270 SF
PERVIOUS AREA: 24,330 SF
EQUIVALENT RUNOFF AREA: 26,980 SF
SE 40TH ST
228TH AVE SE
224TH LANE SE
17,863 sf
24,571 sf
109,520 sf
7,046 sf
3,880 sf
2,270 sf

bassetti architects

71 Columbia Street, Suite 500
Seattle, Washington 98104
T (206) 340 9500 F (206) 340 9519

CIVIL ENGINEER
AHBL
1200 6th Avenue, Suite 1620
Seattle, WA 98101
T (206) 267 2425

LANDSCAPE ARCHITECT
AHBL
1200 6th Avenue, Suite 1620
Seattle, WA 98101
T (206) 267 2425

STRUCTURAL ENGINEER
PCS
1011 Western Avenue, Suite 810
Seattle, WA 98104
T (206) 292 5076

MECHANICAL ENGINEER
Hargis
1201 Third Avenue, Suite 600
Seattle, WA 98101
T (206) 448 3376

ELECTRICAL ENGINEER
Travis Fitzmaurice & Associates
1200 Westlake Ave N, Suite 509
Seattle, WA 98109
T (206) 285 7228

THEATER
PLA Designs
5285 NE Elam Young Pkwy, Ste B500
Hillsboro, OR 97124
T (503) 642 2168

GENERAL CONTRACTOR
Skanska
221 Yale Ave N, Suite 400
Seattle, WA 98109
T (206) 726-8000

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REVISIONS DATE

ISSAQUAH SCHOOL DISTRICT NO. 411

ISSAQUAH HS #4 AND ES #17

4221 228TH AVE SE; ISSAQUAH, WA 98029

JOB NO: 1802
ISSUE DATE: 04/16/2020

Jurisdiction Stamp Area

HISTORIC BASIN MAP

EX-1

PROVIDENCE POINT OUTFALL SUBBASINS CHARACTERISTICS CALCULATIONS

Historic Basins

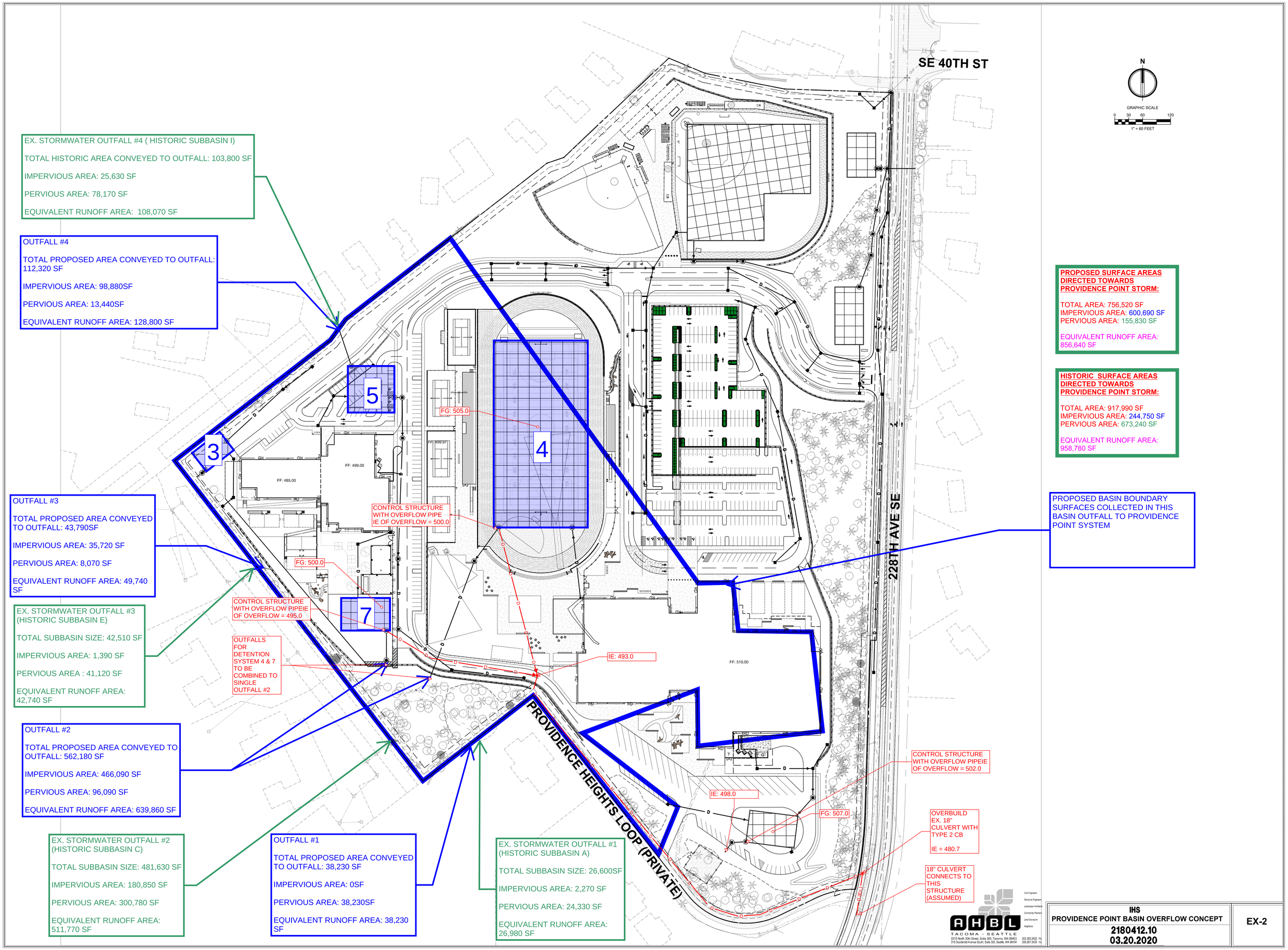
Historic Basin	TOTAL AREA	IMPERVIOUS	PERVIOUS	EQUIVALENT RUNOFF AREA
A	26600	2270	24330	26978
B	10750	270	10480	10795
C	481630	180850	300780	511772
D	176310	30090	146220	181325
E	42510	1390	41120	42742
F	1200	0	1200	1200
G	64650	3880	60770	65297
H	10540	370	10170	10602
I	103800	25630	78170	108072
TOTAL	917990	244750	673240	958782

Impervious CN	98	
Pervious CN	84	
CN Ratio	1.17	(Impervious CN/Pervious CN)

Equivalent Runoff Area = Impervious Surface Area x CN Ratio + Pervious Surface Area

Developed Basins

PROPOSED OUTFALL	TOTAL AREA	IMPERVIOUS	PERVIOUS	EQUIVALENT RUNOFF AREA
1	38230		38230	38230
2	562180	466090	96090	639862
3	43790	35720	8070	49743
4	112320	98880	13440	128800
TOTAL	756520	600690	155830	856635



EX. STORMWATER OUTFALL #4 (HISTORIC SUBBASIN I)

TOTAL HISTORIC AREA CONVEYED TO OUTFALL: 103,800 SF

IMPERVIOUS AREA: 25,630 SF

PERVIOUS AREA: 78,170 SF

EQUIVALENT RUNOFF AREA: 108,070 SF

OUTFALL #4

TOTAL PROPOSED AREA CONVEYED TO OUTFALL: 112,320 SF

IMPERVIOUS AREA: 98,880SF

PERVIOUS AREA: 13,440SF

EQUIVALENT RUNOFF AREA: 128,800 SF

OUTFALL #3

TOTAL PROPOSED AREA CONVEYED TO OUTFALL: 43,790SF

IMPERVIOUS AREA: 35,720 SF

PERVIOUS AREA: 8,070 SF

EQUIVALENT RUNOFF AREA: 49,740 SF

EX. STORMWATER OUTFALL #3 (HISTORIC SUBBASIN E)

TOTAL SUBBASIN SIZE: 42,510 SF

IMPERVIOUS AREA: 1,390 SF

PERVIOUS AREA : 41,120 SF

EQUIVALENT RUNOFF AREA: 42,740 SF

OUTFALL #2

TOTAL PROPOSED AREA CONVEYED TO OUTFALL: 562,180 SF

IMPERVIOUS AREA: 466,090 SF

PERVIOUS AREA: 96,090 SF

EQUIVALENT RUNOFF AREA: 639,860 SF

EX. STORMWATER OUTFALL #2 (HISTORIC SUBBASIN C)

TOTAL SUBBASIN SIZE: 481,630 SF

IMPERVIOUS AREA: 180,850 SF

PERVIOUS AREA: 300,780 SF

EQUIVALENT RUNOFF AREA: 511,770 SF

OUTFALL #1

TOTAL PROPOSED AREA CONVEYED TO OUTFALL: 38,230 SF

IMPERVIOUS AREA: 0SF

PERVIOUS AREA: 38,230SF

EQUIVALENT RUNOFF AREA: 38,230 SF

EX. STORMWATER OUTFALL #1 (HISTORIC SUBBASIN A)

TOTAL SUBBASIN SIZE: 26,600SF

IMPERVIOUS AREA: 2,270 SF

PERVIOUS AREA: 24,330 SF

EQUIVALENT RUNOFF AREA: 26,980 SF

PROPOSED SURFACE AREAS DIRECTED TOWARDS PROVIDENCE POINT STORM:

TOTAL AREA: 756,520 SF
IMPERVIOUS AREA: 600,690 SF
PERVIOUS AREA: 155,830 SF

EQUIVALENT RUNOFF AREA: 856,640 SF

HISTORIC SURFACE AREAS DIRECTED TOWARDS PROVIDENCE POINT STORM:

TOTAL AREA: 917,990 SF
IMPERVIOUS AREA: 244,750 SF
PERVIOUS AREA: 673,240 SF

EQUIVALENT RUNOFF AREA: 958,780 SF

PROPOSED BASIN BOUNDARY SURFACES COLLECTED IN THIS BASIN OUTFALL TO PROVIDENCE POINT SYSTEM

AHBL
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316 Occidental Avenue South, Suite 320, Seattle, WA 98104 206.267.2425 TEL
Civil Engineers
Structural Engineers
Landscape Architects
Community Planners
Land Surveyors
Neighbors

IHS
PROVIDENCE POINT BASIN OVERFLOW CONCEPT
2180412.10
03.20.2020

EX-2